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Executive
Summary

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(e) EXECUTIVE SUMMARY

A. Description of BUSHMASTER Full Scale Development Program. This thirty-month program is composed of a 17-month development period and a 13-month evaluation period.

(U) During the development period, the contractor will complete the development on the BUSHMASTER weapon and ammunition, perform a Research and Development Acceptance Test, and manufacture 26 weapons and 545,000 rounds of various types of ammunition for Government tests.

During the evaluation period, the contractor will finish the Technical Data Package on the System and will perform liaison, training, and other services.

B. (U) AAI Plan for Successful Performance of Full Scale Development. It is AAI's intention to successfully complete the FSD program within the cost and schedule restraints in accordance with the following plan.

1. (U) Weapon and Feeder. To improve the weapon reliability, development will be continued throughout the Validation period of 9 months at AAI. This company-funded effort will allow for a continuing effort to improve weapon performance. It will essentially allow for as much development time as the Validation phase and will greatly improve the weapon reliability.

(U) During the FSD development period, three weapons will be built and subjected to an intensive test program. Over 200,000 rounds will be fired with two development teams testing the weapons concurrently.

(U) Manufacture of the weapons will be performed mainly by experienced subcontractors with assembly and specialty help from AAI.

(U) The Research and Development Acceptance Test will be conducted in the 14th month at AAI and the Ft. Dix Experimental Range.

2. (U) Ammunition. After a short development period to correct problem areas, AAI will subcontract most of the ammunition components to proven vendors who are expert in their given fields of production. AAI will maintain the capability to produce any component as a back-up source for any subcontractor having difficulty maintaining his commitment.

(U) Load, assembly and pack (LAP) functions for the target-practice (TP-T) and the high-explosive (HEI-T) cartridges will be subcontracted to the Lake City Army Ammunition Plant (LCAAP). AAI will perform the LAP for the armor-piercing (AP-T) and the multiple-flechette (MF) cartridges.

3. (U) Preparation of Software for Technical Data Package. AAI will prepare the Technical Data Package for the weapon and ammunition using its experienced engineering and manufacturing staff. This team prepared the Technical Data Package for the 40mm M203 Grenade Launcher for the U. S. Army Weapons Command in 1970.

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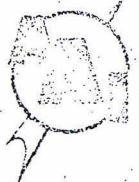
4. (U) Method of Maintaining Established Milestones. AAI will keep the program on schedule by proper use of the basic management tools of Planning, Organization, and Control. The following factors will help in maintaining the vital Control function:

- a. The use of an experienced and motivated project staff.
- b. The backing of a company management totally committed to a successful program.
- c. The use of AAI facilities as a back-up manufacturing source.

5. (U) Application of "Design-to-Unit Production Cost Estimate" Concepts. AAI plans to apply the "Design-to-UPCE" concept at the design engineering level. This means that each engineer will be applying these principles at the drawing board. To insure a successful program, the engineering staff will be given training in UPCE. Proper motivation will be provided by the use of an awards competition.

C. (U) Summary of Trade-Off Analysis. The following chart shows a trade-off analysis summary for the AAI BUSHMASTER concept:

ITEM	AAI HAS CHOSEN	RATHER THAN	REASONS FOR AAI CHOICE
Barrel Material	Inconel Alloy 718 (Nickel-base, heat-resistant alloy)	4150 steel	Inconel 718 alloy gives: 1. one-half the barrel weight. 2. twice the barrel life. 3. satisfactory performance at 1200°F.
Receiver Material	18% Nickel Maraging Steel	4340 Steel	Maraging steel gives: 1. a lighter, smaller receiver because of higher allowable strength. 2. less warpage in heat treat. 3. longer receiver life because of greater fatigue strength.
Link Material	Glass-reinforced Nylon	Steel	Glass-reinforced nylon links: 1. are cheaper in production. 2. are completely corrosion free. 3. reduce belt-pull peak loads.
Cartridge Case Material	A reinforced plastic and aluminum 2-pc. design	Brass, steel, or all aluminum	Plastic aluminum cartridge cases: 1. contribute to a lightweight cartridge. 2. have excellent producibility. 3. reduce corrosion problems.
HEI-T Projectile Self-Destruct	Fuze self-destruct	Tracer-activated self-destruct	Fuze self-destruct is almost cost free with the AAI fuze since same parts needed for graze sensitivity are used for self-destruct.
HEI-T Fuze	An AAI designed fuze	M505, 714, or any other fuze	The AAI designed fuze: 1. is simple and inexpensive, yet has graze sensitivity and self-destruct features. 2. completely and directly interchangeable with the M505 fuze.



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Executive
Summary

D. ~~(S)~~ Summary of Advantages of AAI BUSHMASTER System

a. (U) Weapon

- Low weight - 132 pounds, including 33-lb. barrel.
- Small configuration for turret applications.
- Low production cost - \$9,300 per weapon predicted.

b. ~~(S)~~ Ammunition

- Small volume - 17.5 cubic feet per 1,000 linked cartridges
- High-performance AP-T projectile - Improved accuracy, superior penetration, flat trajectory, low flight time.
- Light weight - 970 pounds per 1,000 linked cartridges.
- Fuze - Graze-sensitive, self-destruct, cost-effective.
- HEI-T Projectile - High lethal area (side and rear of projectile).

c. (U) Low Cost - Predicted Costs in Production:

Item	Unit Cost (\$)
Weapon	9,300.00
HEI-T Cartridge	4.42
AP-T Cartridge	4.60
TP-T Cartridge	2.07
MF Cartridge	4.39

E. (U) Description of AAI Bushmaster Design. The following pages graphically describe the AAI BUSHMASTER Weapon System.

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1. Envelope
 - a. Overall Length - - - - - 104 inches
 - b. Barrel Length - - - - - 70 inches
 - c. Height - - - - - 8 inches
 - d. Width (not incl. dual feeders) - - - - - 6 inches
2. Weights

	<u>"A" Feeder</u>	<u>"B" Feeder</u>
a. Barrel/receiver assembly (recoiling) - - -	87 lbs.	93 lbs.
b. Fixed receiver, dual feeder, firing controls (non-recoiling) - - -	45 lbs.	25 lbs.
c. Total weapon system weight - - -	132 lbs.	118 lbs.
3. Caliber - - - - - 25mm/5° Twist Rate
4. Ammunition Types - - - - - API-T, HEI-T, TP-T, MF
5. Principle of Operation - - - - - Self-powered (recoil-operated feed and recoil-operated belt accelerator); open bolt firing mechanism.
6. Mode of Fire - - - - - Selective; auto or semi-auto
7. Rate of Fire - - - - - Adjustable 0-550 rd/min
8. Charging - - - - - Manual or remote (with integral electric charger)
9. Barrel - - - - - Quick change
10. Ejection - - - - - Forward - below barrel
11. Maximum Trunnion Reaction - - - - - 9000 pounds
12. Recoil Buffer - - - - - Propellant gas operated
13. Feed - - - - - Weapon powered; instantaneous manual or remote selection of two ammo types.
14. Belt Pull - - - - - 180 pounds

(U) AAI BUSHMASTER Weapon Characteristics

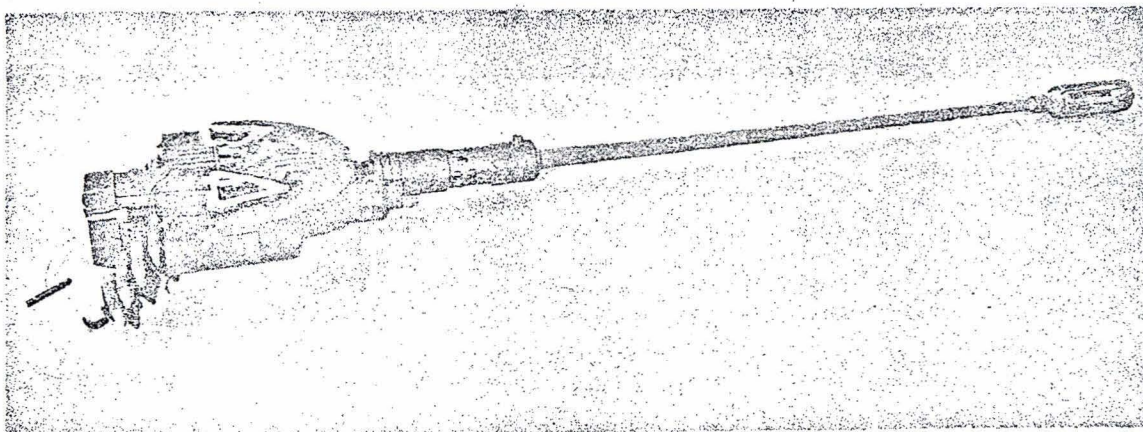
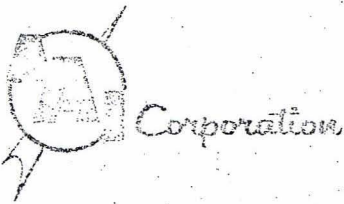


FIGURE 0.1

(U) AAI 25MM BUSHMASTER Weapon Developed During Validation



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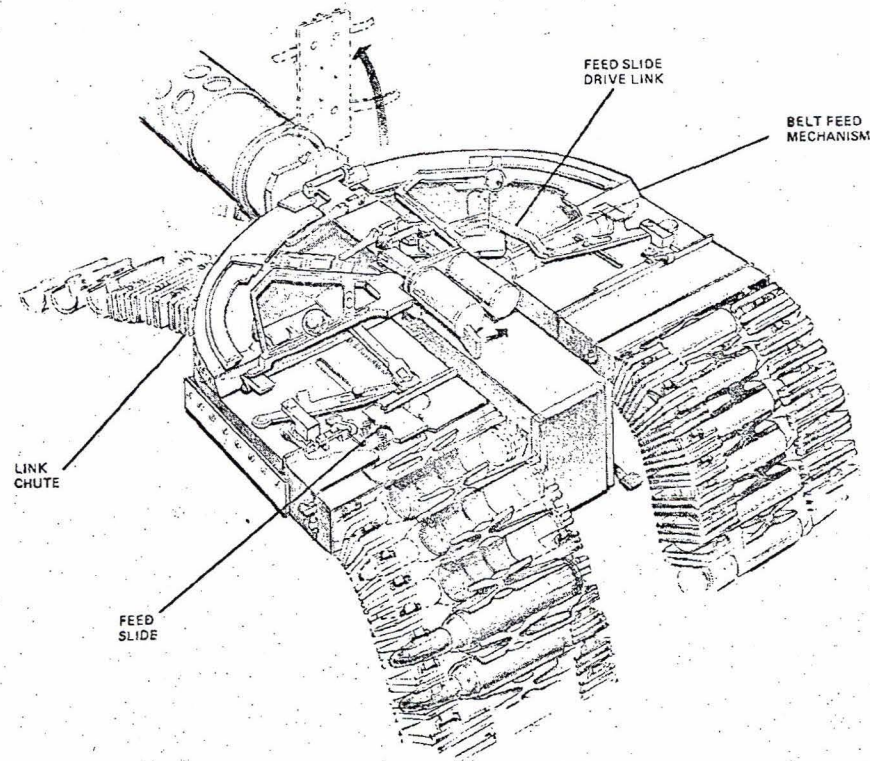


FIGURE 0.4 (U) Belt Feed Mechanism

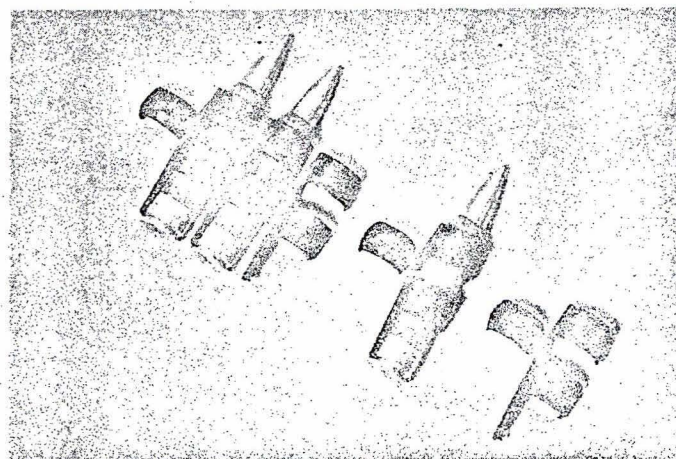


FIGURE 0.5 (U) Glass-Reinforced Plastic Link

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AMMUNITION CHARACTERISTICS

(C) HEI-T Cartridge

Bore Size	- 25mm	Projectile Weight (Steel Body)	- 3,200 grains
Muzzle Velocity	- 3,250 fps	Propellant Charge (Single-Base, Deterred)	- 1,032 grains
Tracer Burnout Range	- 2,000 meters	Cartridge Case (Composite Plastic/Aluminum)	<u>1,708 grains</u>
Explosive Charge	- Aluminized (480 grains)	Total Cartridge Weight	- 5,940 grains
Fuze	- AAI design		
Self-Destruct	- Fuze actuated		

(C) TP-T Cartridge

Bore Size	- 25mm	Projectile Weight (Steel Body)	- 3,200 grains
Muzzle Velocity	- 3,250 fps	Propellant Charge (Single-Base, Deterred)	- 1,037 grains
Trajectory	- matches HEI-T round	Cartridge Case (Composite Plastic/Aluminum)	<u>1,708 grains</u>
Tracer:		Total Cartridge Weight	- 5,945 grains
R-284 Mixture	- 30 grains		
Burnout Range	- 3,500 meters		

(C) AP-T Cartridge

Bore Size	- 25mm	Penetrator Weight (Composite Tungsten Alloy)	- 1,000 grains
Muzzle Velocity	- 4,300 fps	Sabot Weight (Segmented Glass-Filled Polyester)	- 580 grains
Armor Penetration* (1000 meters)	- 1½ in. at 60°	Seals: Base (Nylon)	- 120 grains
Tracer (Compacted in Fin Root Cavity):		Sabot (Polyethylene)	- 15 grains
R-284 Mixture	- 5.5 grains	Propellant Charge (Single-Base, Deterred)	- 1,170 grains
Burnout Range	- 4,000 meters	Cartridge Case (Composite Plastic/Aluminum)	- <u>1,708 grains</u>
		Total Cartridge Weight	- 4,593 grains

(C) Multiple-Flechette Cartridge

Bore Size	- 25mm	Projectile Weight	- 1,470 grains
Muzzle Velocity	- 4,650 fps	Propellant Charge (Single-Base, Deterred)	- 1,250 grains
Flechettes:		Cartridge Case (Composite Plastic/Aluminum)	- <u>1,708 grains</u>
Number	- 88	Total Cartridge Weight	- 4,428 grains
Type	- SPIW (modified)		
Individual Weight	- 10 grains		
Total Package			
Dispersion, σ_F	- 20 mils		

* RHA per MIL-S-12560

FIGURE 0.6 (C) AAI BUSHMASTER Ammunition Characteristics

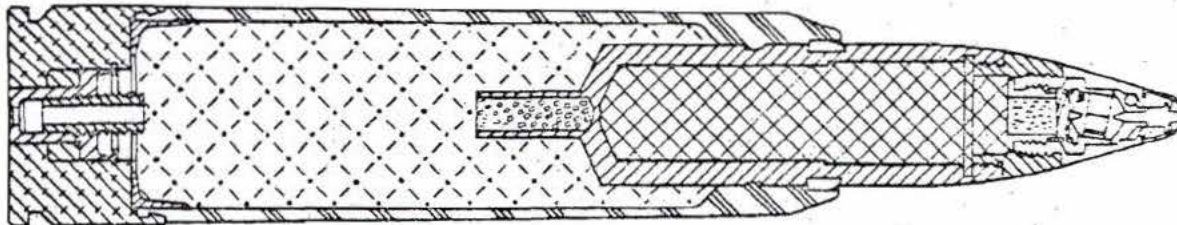
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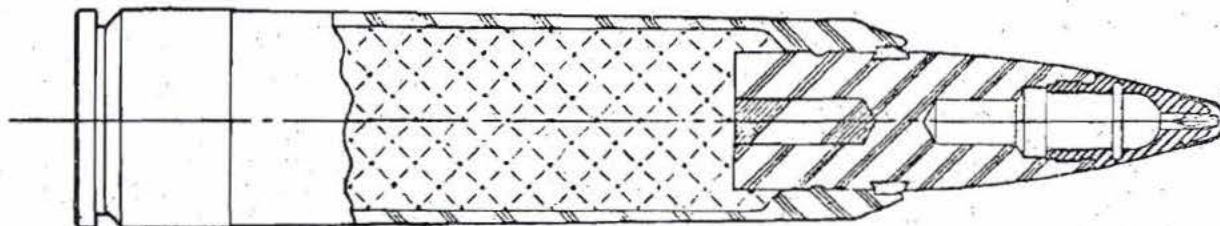
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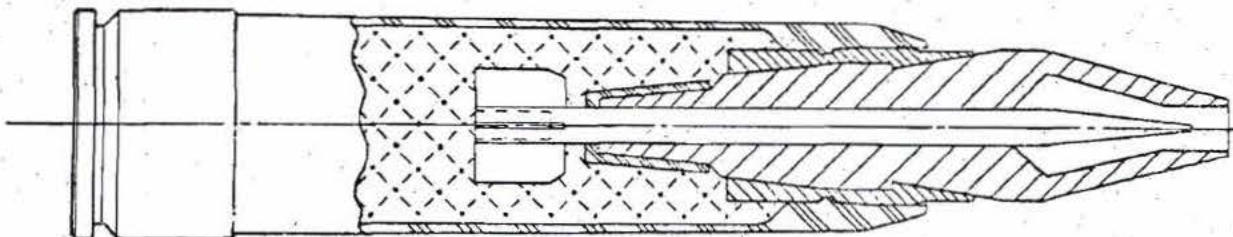
CARTRIDGE CROSS-SECTIONS



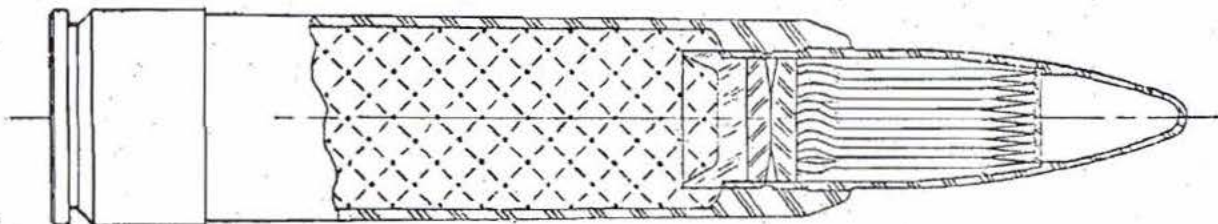
HFI-T Cartridge



TP-T Cartridge



AP-T Cartridge



Multiple-Flechette Cartridge

FIGURE 0.6 (Con'd) ~~(c)~~ AAI BUSHMASTER Ammunition Characteristics

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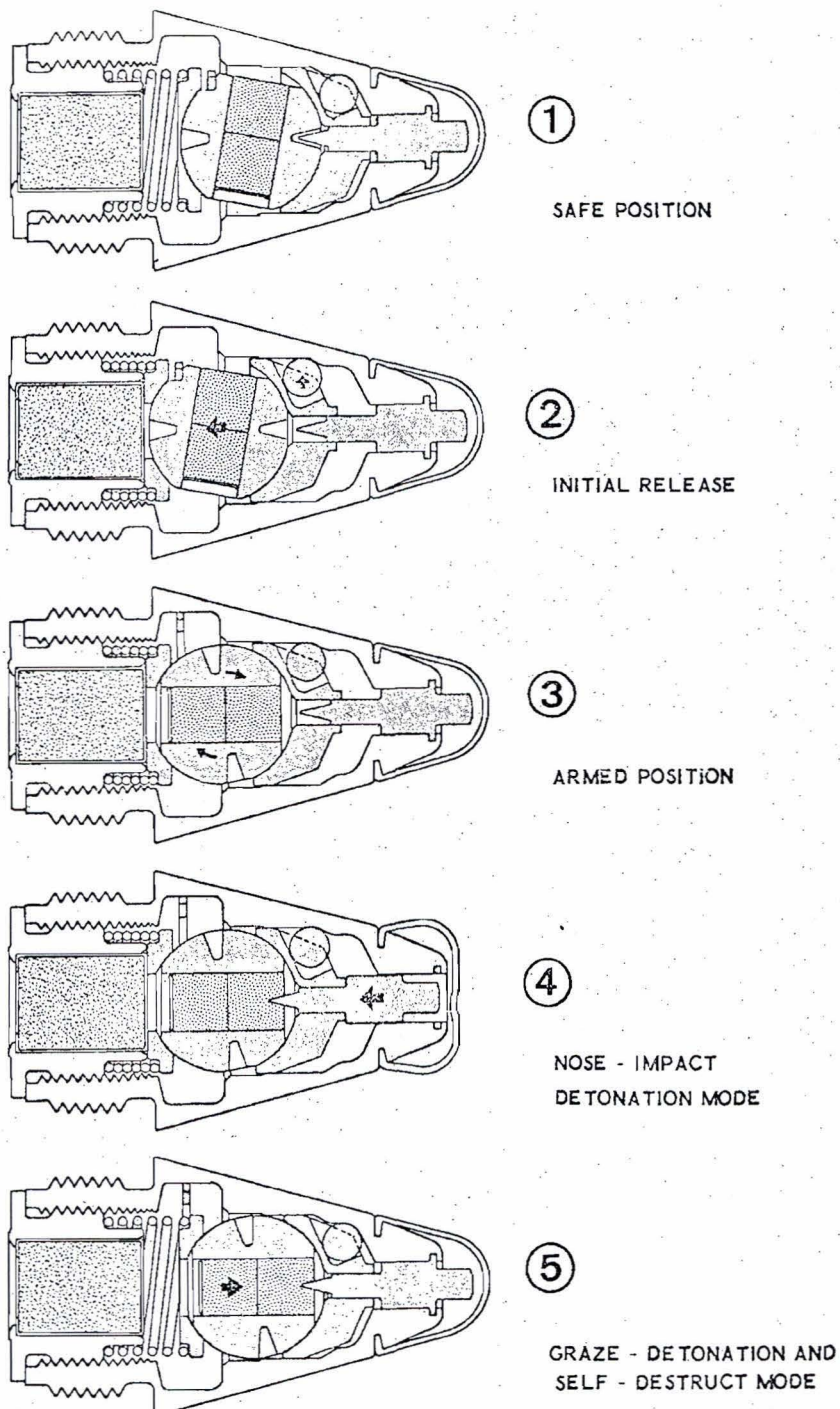


FIGURE 0.7 (U) Details of AAI Fuze